Statement of

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On Behalf of the
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Public Buildings and Emergency Management
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United States House of Representatives

"Capital Crisis Management: Maintaining Federal Real Estate with the Dwindling Federal Building Fund"

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Good morning Chairwoman Norton, Ranking Member Diaz-Balart, and members of the Subcommittee. Thank you for holding this important hearing on the Federal Building Fund. I am Richard Greninger, Managing Partner, Carr Services, and I am here today on behalf of the Building Owners and Managers Association (BOMA) International. Thank you for the opportunity to share BOMA's perspectives on best practices in managing a building maintenance program.

To begin, I would like to clarify that my comments are limited to general industry best practices and are not intended to infer that GSA does or doesn't follow these practices.

Buildings are designed and built to last for decades. But in order to keep the building in good repair, keep systems running at their optimal performance levels, and attract and retain quality tenants, buildings must have a management plan in place and adequately budget for repairs and maintenance.

Much of the work that needs to be done on a regular basis is the maintenance of the structure itself, including painting and façade repairs. Other basic upkeep items include general maintenance of the roads and grounds, including snow removal and landscaping.

According to BOMA's 2009 Experience Exchange Report (EER)[1], private sector commercial office buildings, on average, spent $1.80 per square foot on repair and maintenance, and an additional $0.23 per square foot on roads and grounds in 2008. This represents approximately 25.5% of a building's operating expenses (see Appendix 1). Other operating expenses include cleaning, utilities, security and administrative costs.

For government buildings[2], the amount spent on repairs and maintenance is higher ($2.43 per square foot). The combined expense of repairs, maintenance, roads and grounds for government buildings accounts for approximate 28% of the operating budget (see Appendix 2).

As you can see, the comparison is relatively dramatic. The repair/maintenance costs in public sector buildings are considerably higher than in private sector buildings. Less preventive maintenance and a higher average age of the buildings in the data set may explain this, although we just ask for the numbers and we do not survey about maintenance practices.

When setting the annual budget for a portfolio of buildings, property managers typically first look at their global standards (such as services, contracts, and insurance) that are passed through across the entire portfolio, and then look at the historical information for each specific building to determine if any major repairs need to be made, equipment needs to replaced, or if expenses can be expected to be higher or lower due to work that was done during previous years or deferred. Finally, we look to BOMA's EER to determine if we are in the same ball park as other buildings in our market in order to stay competitive.

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[1] The Experience Exchange Report (EER) is commercial real estate's benchmarking tool for income and expense data. Data set includes all buildings that submitted data for the 2008 calendar year.

[2] Government buildings reporting data were primarily GSA buildings, but some state and county government buildings were also included.

For the building as well as the building systems to remain fully operational as they were designed, the property manager and the building's engineering team need to develop a maintenance program. Most properties' programs include three basic types of maintenance: *reactive* maintenance, *preventive* maintenance and *predictive* maintenance.

Reactive Maintenance

The degree to which the property dedicates its resources to each form of maintenance depends greatly on the owner's objective for the property, the staffing level and skill set of the engineering employees assigned to the property, and a host of other factors.

As the name implies, reactive maintenance occurs when the building system has already broken and needs repairing or requires calibration. This type of maintenance typically bothers tenants the most because they have no warning that the system will be out of service.

In addition, reactive maintenance can be tremendously disruptive to your engineering team members. When reactive maintenance is prevalent at a property, the engineers no longer control the work schedule—the work schedule controls them. In reactive maintenance, your engineers often go from one system failure to another. As soon as they fix one component, something else breaks down.

Examples of reactive maintenance include replacing light tubes and bulbs when they burn out, fixing a motor when it fails or repairing a pump when it seizes up.

All buildings employ some degree of reactive maintenance. No maintenance system can predict or prevent failures with 100 percent certainty. Even if such a system existed, it would be too expensive to manage in a commercial building. In the long term, however, reactive maintenance programs tend to be expensive; equipment that is not maintained proactively often fails earlier and costs more to operate than equipment that is maintained aggressively ahead of time.

Sometimes, in buildings where reactive maintenance is a primary focus, the engineering team members do not have the skills, the staffing, or the time to design an engineering system that manages the maintenance function differently. When this is the case, additional education opportunities, supervision by a senior engineer, and additional staffing on a temporary basis may enable the team to "get ahead" and help change their mindset from reactive maintenance to a focus on preventive and predictive maintenance.

In some cases, reactive maintenance may actually be the preferred strategy. If, for example, the owner is preparing to perform extensive renovations of a vacant building, he may choose to contain costs before construction begins by fixing only the critical components that malfunction. But any savings are short-term; reactive maintenance is almost always more expensive in the medium and long term, both in terms of dollars spent and tenant dissatisfaction and ultimate turnover.

Preventive Maintenance

Preventive maintenance is the opposite of reactive maintenance. Instead of repairing system components only when they break, preventive maintenance strives to *prevent* the system components from ever breaking.

Preventive maintenance lowers operating and utility costs and, in many cases, extends the useful life of system components. In addition, evidence of a good preventive maintenance program improves the value of the property at a sale because the purchaser believes the systems are in good condition and won't need to be replaced in the near future. Plus, tenant satisfaction levels may improve because tenants are inconvenienced less when maintenance is done on a time-based schedule.

Preventive maintenance for a typical piece of equipment involves taking it apart, inspecting the parts, replacing any worn parts, replacing seals and gaskets, lubricating the moving parts to improve wear, and putting the equipment back together. In almost all cases, the manufacturer of the equipment provides preventive maintenance standards. The goal is that, by planning the preventive maintenance properly, the systems can remain in operation without failure.

Preventive maintenance is based upon visual inspections of equipment (looking for damaged components before they fail) and regular maintenance schedules. In fact, the centerpiece of the preventive maintenance program is a preventive maintenance schedule, a listing of all the preventive maintenance tasks (and a plan to achieve them) during the year, and diligent record keeping.

Typically, the manufacturer of each piece of equipment provides not only a list of the specific tasks required for each preventive maintenance session but also the suggested interval between maintenance sessions.

Using a common metric, one building engineer can handle preventive maintenance tasks for about 200,000 square feet of office space, depending upon the type of equipment in the building. This assumes that the engineer does only preventive maintenance, with someone else handling all service calls and repairs.

Take, for example, the recommended maintenance on a self-contained unit (SCU) as part of the HVAC system.

Description	**Hours**	**Frequency**	**Total**
Annual Maintenance	4.8	1	4.8
Semi-annual Maintenance	3.2	2	6.4
Quarterly Maintenance	1.9	4	7.6
Monthly Maintenance	1	12	12
Total Preventive Maintenance			**30.8**

Assuming the building has 11 SCUs and each SCU requires 30.8 hours per year of preventive maintenance, the 11 units will require a total of 339 hours of annual preventive maintenance.

That's 8 ½ weeks of time for one engineer just to maintain one portion of the HVAC system—assuming the engineer does nothing else but preventive maintenance. (Incidentally, this preventive maintenance function alone would represent almost one-sixth of the engineer's total work time for the year. Dozens of other pieces of equipment would need to be maintained during the year as well.)

Doing preventive maintenance well is time consuming. Often, the first task that gets delayed when the work tickets start piling up is preventive maintenance. In some cases, the logic is circular: Preventive maintenance prevents breakdowns of the equipment and reduces the number of reactive maintenance operations. When this is the case, the short-sighted owner or property manager may look at the work tickets, see very few reactive tickets, and cut staff to improve the financial performance of the property. This strategy tends to work for a short time, but without the proper preventive maintenance the systems will soon need expensive reactive repairs.

Predictive Maintenance/Reliability Centered Maintenance (RCM)

The third type of maintenance, which is growing in popularity among high-performance organizations, is predictive maintenance. Many people use the term reliability centered maintenance (RCM) interchangeably with the term "predictive maintenance." Predictive maintenance is a program that uses approved nondestructive testing procedures to analyze the condition of building equipment and relies on statistics, measurement, and experience to predict equipment service and maintenance requirements.

Like preventive maintenance, predictive maintenance is proactive. Systems are maintained before they break, as a means of preventing the breakdown completely. Where preventive maintenance relies upon a time-based schedule (every x weeks or months), predictive maintenance uses statistics, measurement, and experience to determine the service interval for a particular piece of equipment.

Typical measurements used in predictive maintenance include:

- Vibration analysis on motors
- Infrared testing on electrical components
- Fiber optic testing
- Ultrasonic testing
- Analysis of operating histories of similar machines over a long period of time

Predictive maintenance is based upon the fact that, before a piece of equipment fails, certain measurements will start to change. In a typical predictive maintenance program, the time intervals between preventive maintenance operations are based not on the calendar but on when the equipment actually needs maintenance to continue its optimum performance (run time vs. scheduled time).

Returning to the example of the self-contained unit in the HVAC system, predictive maintenance would call for a measurement of the equipment's performance. Instead of performing monthly, quarterly, semi-annual, and annual maintenance tasks based upon the calendar, the chief engineer

would tailor the maintenance program to the specific SCU based on the results of a detailed analysis. Because each piece of equipment is evaluated individually and has different needs for service, each one would have a different maintenance schedule.

Major equipment manufacturers have begun to embrace the concept of predictive maintenance. As an example, an elevator company may determine that a particular part begins to fail after 100,000 stops at a floor in the building. The elevator mechanic will be able to record the number of stops made by each elevator cab and replace the part when each cab records 100,000 stops. Instead of guessing when the part will break down, the elevator company can use its previous experience to know that the part becomes more likely to cause a failure after a certain amount of use. By replacing the part shortly before it would fail on its own, the company minimizes the maintenance cost and maximizes the amount of time the elevators are in service.

Preventive maintenance may call for a part to be replaced every year, regardless of the amount of use the equipment received. With predictive maintenance, the specific use pattern of each piece of equipment and the measurements taken to show how the equipment is working are used in the decision process.

In conclusion, building owners and managers must look at both short-term and long-term costs when developing a maintenance plan and budget for their buildings. The General Services Administration has done a good job with the tools they have been given. However, to most effectively manage a diverse range of facility design, construction, rehabilitation, restoration, renovation, and operations projects, they must be given sufficient funding.

We thank the Subcommittee for holding this important hearing and hope this testimony has provided some insight on building maintenance programs and industry best practices. I welcome any questions you may have.

About BOMA International

Founded in 1907, the Building Owners and Managers Association (BOMA) International is an international federation of more than 100 local associations and affiliated organizations. BOMA International's members are building owners, managers, developers, leasing professionals, medical office building managers, corporate facility managers, asset managers, and the providers of the products and services needed to operate commercial properties. Collectively, BOMA's 17,000 members own or manage more than nine billion square feet of office space, which represents a $100 billion marketplace and more than 80 percent of the prime office space in North America.

Appendix 1: Experience Exchange Report ®

Report Year:	2008	**Sector:**	Private	**Building Size:**	All Sizes	**Unit of Measure:**	Square Feet
Country:	USA	**Building Type:**	All Building Types	**Public Transit:**	Any Proximity	**Location:**	All Locations
Market:	All Markets	**Ownership Type:**	All Types	**All Electric:**	Any	**Building Age:**	All Ages
Zip Code:	All Zip Codes	**Number of Floors:**	All Heights	**Agency Managed:**	Any		
% Gov't Tenants:	All Occupancy Ranges	**% 24/7 Tenants:**	All Occupancy Ranges	**% Pvt. Tenants:**	All Occupancy Ranges		

Income and Expense Overview - 2008

	Total Building Rentable Area					**Total Office Rentable Area**			
	2,948 Blds	511,492,264 Sq. Ft.				498,619,570 Sq. Ft.			
		Dollars/S.F.		**Mid Range**		**Dollars/S.F.**		**Mid Range**	
	# Blds	*Avg*	*Mdn*	*Low*	*High*	*Avg*	*Mdn*	*Low*	*High*
Income									
Total Rental Income	2,348	23.31	20.31	15.80	25.98	23.90	20.42	15.94	26.19
Total Income	2,344	24.66	20.87	16.08	26.90	25.33	21.01	16.25	27.24
Expense									
Total Oper Exp	2,492	7.75	6.87	5.73	8.26	7.97	6.96	5.75	8.43
Total Oper + Fixed	2,481	11.55	9.62	7.93	11.80	11.87	9.71	8.00	12.00

Income and Expense Summary - 2008

Income									
Office Rent	2,361					23.56	20.37	15.96	25.99
Retail Rent	329	19.65	17.71	9.77	30.00				
Other Rent	138	7.77	8.62	3.80	17.91				
Telecom Income	475	0.23	0.07	0.02	0.21				
Miscellaneous Income	1,582	1.44	0.30	0.09	1.23				
Expense									
Cleaning	2,525	1.41	1.19	0.93	1.57	1.43	1.19	0.94	1.58
Repair / Maintenance	2,691	1.66	1.32	0.90	1.84	1.80	1.39	0.99	1.91
Utility	2,554	2.24	2.11	1.55	2.75	2.42	2.20	1.66	2.85
Roads / Grounds	2,632	0.23	0.28	0.13	0.46	0.23	0.28	0.13	0.47
Security	2,190	0.70	0.33	0.09	0.66	0.71	0.34	0.09	0.68
Administrative	2,709	1.35	1.22	0.85	1.62	1.38	1.23	0.86	1.65
Fixed	2,739	3.79	2.64	1.88	3.68	3.89	2.67	1.90	3.72
Directly Expensed	1,400	1.48	0.19	0.06	1.11	1.52	0.19	0.06	1.13
Amortized Leasing	562	2.61	1.47	0.59	3.10	2.70	1.51	0.61	3.18
Parking	299	1.08	0.36	0.14	0.90	1.12	0.37	0.15	0.91
Telecom	203	0.05	0.04	0.02	0.07	0.05	0.04	0.02	0.07

Appendix 2: Experience Exchange Report ®

Report Year:	2008	**Sector:**	Government	**Building Size:**	All Sizes	**Unit of Measure:**	Square Feet
Country:	USA	**Building Type:**	All Building Types	**Public Transit:**	Any Proximity	**Location:**	All Locations
Market:	All Markets	**Ownership Type:**	All Types	**All Electric:**	Any	**Building Age:**	All Ages
Zip Code:	All Zip Codes	**Number of Floors:**	All Heights	**Agency**	Any		
% Gov't Tenants:	All Occupancy Ranges	**% 24/7 Tenants:**	All Occupancy Ranges	**% Pvt. Tenants:**	All Occupancy Ranges		

Income and Expense Overview - 2008

	Total Building Rentable Area					Total Office Rentable Area			
	515 Bldg	106,806,629 Sq. Ft.				91,081,616 Sq. Ft.			
		Dollars/S.F.		Mid Range		Dollars/S.F.		Mid Range	
	# Blds	*Avg*	*Mdn*	*Low*	*High*	*Avg*	*Mdn*	*Low*	*High*
Income									
Total Rental Income	65	17.75	17.81	12.94	24.97	18.08	17.81	13.26	25.11
Total Income	66	19.31	18.00	13.13	25.29	19.77	18.00	13.79	25.50
Expense									
Total Oper Exp	408	7.55	6.78	5.48	8.65	8.94	8.20	6.68	10.59
Total Oper + Fixed	46	10.19	8.89	7.11	10.72	10.48	9.35	7.33	11.01

Income and Expense Summary - 2008

Income									
Office Rent	66					17.67	17.74	13.05	24.97
Retail Rent	11	34.98	31.85	16.42	50.01				
Other Rent	10	17.32	20.43						
Telecom Income	6	0.22	0.01	0.01	0.53				
Miscellaneous Income	30	1.96	1.80	0.69	2.89				
Expense									
Cleaning	423	1.84	1.65	1.31	2.12	2.16	2.05	1.55	2.57
Repair / Maintenance	461	1.94	1.78	1.26	2.35	2.43	2.25	1.62	2.93
Utility	426	2.19	1.69	1.24	2.49	2.62	2.09	1.55	2.95
Roads / Grounds	376	0.14	0.13	0.05	0.36	0.17	0.15	0.07	0.42
Security	335	0.48	0.18	0.06	0.47	0.58	0.22	0.08	0.57
Administrative	430	1.14	0.82	0.56	1.35	1.34	0.99	0.66	1.61
Fixed	55	1.90	1.58	0.32	3.03	1.95	1.58	0.32	3.05
Directly Expensed	15	0.62	0.07	0.02	0.20	0.62	0.07	0.02	0.20
Amortized Leasing									
Parking	11	0.44	0.29	0.09	1.04	0.45	0.29	0.09	1.04
Telecom	6	0.04	0.03	0.02	0.08	0.04	0.03	0.02	0.08